INCREASING THE 4th GRADE STUDENTS SCIENCE COMPETENCY THROUGH PROBLEM BASED LEARNING MODEL

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Abstract. This research aims to improve student learning outcomes in natural sciences for grade 4, second term of the academic year 2016/2017 at SD Negeri Mangunsari 02 Salatiga through the Problem Based Learning model. This classroom action research was conducted in two cycles. Subjects of this study are the fourth grade students of SD Negeri Mangunsari 02 Salatiga, consisted of 14 male students and 9 female students. Data collection was using non-test and test techniques. Results show that in pre cycle condition, student who pass are 11 students (47.82%), i.e. 14 students in cycle I (60.86%), and 20 students (86.95%) in cycle II. The average score in pre cycle condition was 59.13, 68.73 in cycle I, and 75.04 cycle II. Therefore, the application of Problem Based Learning model in lecturing science in the fourth grade of Mangunsari 02 Elementery School Salatiga, can improve the student learning activity.
Keywords: problem based learning, learning result, natural sciences

Currently, the development of information technology that occurs in various aspects of life, causing various changes. These developments also occur in the world of education. Thus, the educational process should be carried out in accordance with the fundamental provisions of the development of science, especially in Natural Science.

According to Susanto (2013), science is a human effort in understanding the universe through proper observation, and using the procedure, and explained by reasoning to receive a conclusion. According to Trianto (2010), natural science is a systematic collection, its application is generally limited to natural phenomena, born and developed through scientific methods such as observation and experimentation and guiding scientific attitudes such as curiosity, openness, honesty, and etc. Meanwhile, natural science is one of science to learn about natural phenomena done through scientific method in the form of observation and experiment so that it can grow critical attitude, active, creative, meticulous, responsibility, confidence, curiosity, cooperation.

Seeing from the benefits of natural science, it can improve students in critical thinking, logical, innovative, creative, and cooperation; thus science is required in elementary school education. Science education in elementary schools should be meaningful to students so that not only with the understanding of the material given. According to Septiasih, et al. (2016), natural science is concerned with how to systematically find out about nature, so that science learning becomes meaningful, and ultimately becomes a fun process. Therefore, science learning needs to use a suitable learning model, so that in the learning process students feel comfortable and can train students' skills in building meaningful knowledge for students. In addition, science learning can also improve the ability to think, curiosity, openness, honesty, critical, logical, innovative, creative and useful cooperation. Rahmasari (2016) emphasizes that science demands a process skill for students to understand the process in detail.

Learning is the effort of teachers to create a learning climate and service to the ability, potential, interests, talents, and needs of students who are very diverse in order to occur optimal interaction between teachers and students and between students (Hamdani 2010). While Komalasari (2010) argues that learning can be defined as a system or process of learning that learners are planned, implemented, and evaluated systematically so that learners can achieve learning goals effectively and

efficiently. In addition, according to Kariani, et al. (2014) learning is also an aid provided by educators to students to obtain information, gain ability, and form an attitude that will be used in everyday life. In other words, learning is a process to help students learn well. So it can be concluded that learning is a teacher effort that is planned, implemented, and evaluated systematically serving the ability, potential, interests, talents, and needs of students so that the interaction between teachers with students to achieve learning objectives efficiently and effectively.

The learning objective can be a self-change of the student from not knowing something to know something, from not understanding to understand. Learning in school should be able to change students themselves. The change is the result of the learning process. Learning in schools should be able to develop attitudes, skills and knowledge of learners. To achieve good learning outcomes must be balanced with a good learning process. Good learning outcomes in accordance with educational objectives are expected to be achieved by learners.

Learning science is the interaction between learning components in the form of learning process to achieve goals in the form of competence that has been established (Widi and Wisudawati, 2013). Science learning in primary school demands to encourage students to have problem-solving skills. This is in line with Trianto (2014) which states that one of the objectives of science teaching can provide the skills and abilities to handle equipment to solve problems and make observations. So science learning is the effort of teachers in the learning process that develops skills and abilities for students to solve problems and make observations to achieve goals in the form of competence that has been established. Therefore, the interaction between teachers and students to achieve learning objectives becomes more efficient and effective. Educators have a great opportunity to cultivate problem-solving skills and environmental care attitudes in learning of science (Handayani et al., 2015).

According to Mudjiono and Dimyati (2009), learning outcomes are the result of an action learning and teaching action. According to Rivai, Nana and Sudjana (2010), learning outcomes are basically the result of a learning process. Susanto (2013) argues that learning outcomes are the abilities that a child acquires through learning activities. Learning outcomes are something that individuals acquire through a learning process characterized by a change in behavior in the form of knowledge and abilities in various ways (Vitasari et al., 2016). Thus, it can be concluded the learning outcomes are a result of the learning process so as to achieve student abilities such as cognitive aspects. Student learning outcomes are not only seen from the achievement of learning outcomes expressed in the score alone but also can be seen from behavioral changes, for example from not knowing to know, and from not understand to understand. In addition, the actions undertaken by teachers in the learning process affect the achievement of learning outcomes. The achievement of learning outcomes will get better results if the action of teachers in teaching is done well. As an effort to improve student learning outcomes, it is necessary to use a learning model that can improve learning to become more meaningful.

Based on the observation in the fourth grade of SD Negeri Mangunsari 02 Salatiga, the science learning process is quite good. However, in the learning process, teachers are still dominant and more active than students. In the process of learning, students still look passive and bored so that the interaction of learning becomes passive and has an impact on student learning outcomes that have not been maximized. Based on data obtained at SD Negeri Mangunsari 02 Salatiga, there are still many fourth grade students whose learning outcomes have not reached the *Kriteria Ketuntasan Minimal* (KKM) or the standard score. This can be seen from 23 students only 11 students who reach the score of KKM and 12 students have not reached the score of KKM. In this case the score of KKM determined by SD Negeri Mangunsari 02 Salatiga ≥65. Less than maximal student learning outcomes, as described above, require teachers' efforts to improve student learning outcomes to achieve KKM gaps by using innovative learning, one of which is a Problem Based Learning (PBL) model.

According to Widi and Wisudawati (2013), PBL is a learning model that exposes students to the problem, so that students can develop their higher thinking ability, problems solving, and gaining new knowledge. According to Jauhar (2011), PBL is a learning model that focuses on meaningful life issues for students so that teachers present problems, ask questions to students, and facilitate inquiry and dialogue. PBL is a learning model that involves students in solving real problems, thus causing motivation and curiosity to increase. The PBL model also provides a platform for students to develop a higher critical thinking and thinking skill (Gunantara et al., 2014). In addition, according to Wulandari et al. (2013), PBL is a learning problem that gives students and students the opportunity to solve the problem by implementing active learning. Thus, in this learning, the student is always active and the teacher is only a facilitator. According to Huda (2013), PBL is a learning that can be obtained through the process of understanding of a problem is met first in the learning process. In principle, in the PBL learning model, the students themselves are actively seeking answers to the problems that the teacher gives. In this case, teachers as mediators and facilitators to assist students in constructing their knowledge effectively (Lestari, 2012)

PBL has the following steps: 1) Student orientation on the problem. The teacher explains the learning objectives, explains the necessary logistics, and motivates the students to engage in problem-solving activities. 2) Organize students to learn. Teachers help the students define and organize learning tasks related to the problem. 3) Guiding individual / group experiences. Teachers encourage students to gather appropriate information, carry out experiments to get explanations and problem solving. 4) Develop and present the work. Teachers assist students in planning and preparing the appropriate work reports, and assisting them for various tasks with their friends. 5) Analyze and evaluate the problem-solving process. Teachers help students to reflect on or evaluate their investigations and processes they used (Hamdayana, 2014).

According to Trianto (2014), PBL has advantages of excess: 1) students better understand on the concepts taught, because they themselves find the concept; 2) involve actively solving the problems and demanding higher student thinking skills; 3) embedded knowledge based on the students' schemata so that the lessons are more meaningful; 4) students can feel the benefits of learning because the problems solved directly related to real life, this can increase students' motivation and interest in the material being studied; 5) make the students more independent and mature, able to give aspirations and accept opinions of others, inculcate a positive social attitude among students; 6) conditioning students in learning groups that interact with each other towards the learners and friends, so that the achievement of student learning completeness is expected. While the weaknesses of PBL are: 1) students have no interest or no belief that the problem learned is difficult to solve, then they will feel reluctant to try; 2) the success of learning requires sufficient time for preparation; 3) without understanding why they are trying to solve the problem, they will not learn what they want to learn (Trianto, 2014).

According to Rahayu et al. (2012), science in schools can apply the scientific method by familiarizing students doing scientific work. Facing students on a problem to seek solutions can motivate students to do scientific work by applying scientific methods. Therefore, in science learning, teachers can apply the PBL Problem model by inviting students to solve problems related to daily life (Agustin, 2013). In this study, PBL learning model applied to science subjects in grade IV of SD Negeri Mangunsari 02 Sidomukti Sub-district Salatiga City to improve student learning outcomes.

METHODS

This type of research is a Classroom Action Research of participants, where the study was conducted with direct involvement of researchers from the initial process to the end. The study was conducted at SD Negeri Mangunsari 02, in the fourth semester of the academic year 2016/2017 with a total of 23 students, consisting of 14 men and 9 women. The study was conducted ± 4 months from January to April 2017. This research is divided into 2 cycles (4 meetings) and in each cycle

consists of 3 steps, namely 1) planning, 2) implementation and observation, and 3) reflection (Taggart in Arikunto, 2010).

The techniques and instruments used in this classroom action research are test and non-test techniques. The test techniques used are multiple choice questions and stuffing. In the non-test technique, the researcher uses two instrument observation sheets which consist of observation sheet of teacher activity and observation sheet of student activity. Data analysis technique used in this research is descriptive quantitative and qualitative technique. Descriptive quantitative obtained based on the test results, while qualitative descriptive techniques obtained based on explanations or explanations of the observations of teacher activities and student activity observation sheets.

RESULTS AND DISCUSSION

Results

From Table 1, it is seen that there are still many fourth grade students whose learning achievement has not reached KKM ≥65. It can be seen that only 11 out of 23 students (47.82%) reached KKM and 12 students (52.17%) still not reached KKM. The lowest score obtained by students is 10 and the highest score obtained by students is 90. The result of the average pre cycle score is 59.13. While in Figure 1, it can be seen that the students' learning mastery is still classified as poor, namely 48%.

Tabel 1. Pre-Cycle Science Learning Outcomes

Score	Number of Students	Percentage%	Description
<65	12	52.17	Not pass
≥65	11	47.82	Pass
Total	23	100	
Average score		59.13	
The highest score		90	
The lowest score		10	

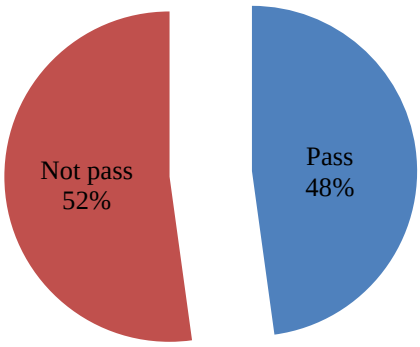

Figure 1. Diagram of Learning Results of Science Class IV Pre-Cycle Students

In Cycle I, the material used is to explain the relationship between natural resources and environment. In the implementation stage, the researcher applied the PBL model consisting of 5 steps: 1) the teacher explains the learning objectives, explains the necessary logistics, and motivates the students to engage in problem-solving activities; 2) teachers help students define and organize learning tasks related to the problem; 3) teachers encourage students to gather appropriate information, carry out experiments for explanation, and problem-solving; 4) the teacher helps the students in planning and preparing the appropriate work

reports, and assisting them for various tasks with their friends; 5) teachers help students to reflect on or evaluate their investigations and the processes they use.

From the evaluation results, students' learning outcomes after the first cycle increase. The lowest score obtained by students is 50 and the highest score obtained by students is 90. Students who still get score <65 are 9 students (39.13%), students who get 65 - 69 score are 4 students (17.39%), Students who received grades 70-74 are 2 (8.69%), students who scored 75 to 79 are 4 (17.39%), students who scored 80 to 84 are 2 (8.69%), The number of students who scored 85 to 89 was 1 person (4.34%), and 1 student (4.34%) reached ≥90. Thus, out of a total of 23 students, 9 students were not complete (39.13%) and 14 students reached completeness (60.86%). While the average score in cycle I reached 68.73 (Table 2). From Figure 1, it can be seen that there is an increase in students' learning mastery. However, this mastery has not reached the target of researchers, namely 80%. Therefore, the researchers proceed to cycle II.

Table 2. Results after Cycle I

Table Score	Number of Students	Percentage (%)	Description
<65	9	39.13	Not pass
≥65	14	60.86	Pass
Total	23	100	
Average score		68.73	
The highest score		90	
The lowest score		50	

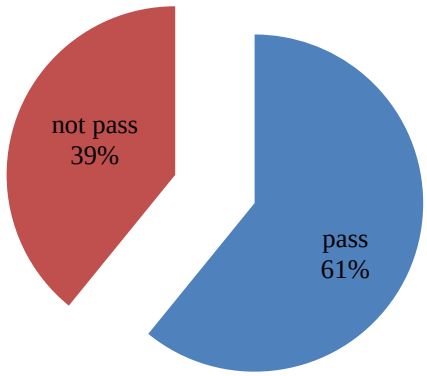

Figure 2. Students' Results After Cycle I

In cycle II, the researchers perform the same steps as in cycle I. In cycle II the material used is to explain the relationship between natural resources with the technology used. Student learning outcomes after cycle II have increased. The lowest score obtained by students is 59 and the highest score obtained by students is 90. There are 3 students (13.04%) who still get score <65, 5 students (21.73%) get score 65 - 69, 3 student (13.04%) scores 70 - 74, 4 students (17.39%) scored 75 - 79, 2 students (8.69%) scored 80 - 84, 3 students (13.04%) got a score of 85 - 89, and 3 students (13.04%) got ≥90 (Table 3). So, out of 23 students, there are 3 unfinished students (13.04%) and there are 20 students (86.95%) complete (Figure 3).

Table 3. Students' Science Learning Result After Cycle II

Score	Number of Students	Percentage (%)	Description
<65	3	13,04	Not pass
≥65	20	86.5	Pass
Total	23	100	
Average score		75.04	
The highest score		90	
The lowest score		59	

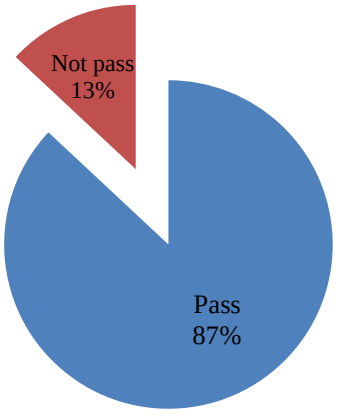

Figure 3. Students' Results After Cycle After Cycle II

When compared to all cycles, it can be seen that students' learning mastery improved from 52.17% in pre cycle condition to 60.86% after cycle I and finally 86.95% after end of cycle II. The average increase was also seen from 59.13 in pre cycle, 68.73 after cycle I, and 75.04 after cycle II (Table 4).

Table 4. Comparison of Student Learning Results in Pre-Cycle, Cycle I and Cycle II

Score	Pre-Cycle		Cycle I		Cycle II	
	Number of Students	Percentage (%)	Number of Students	Percentage (%)	Number of Students	Percentage (%)
Pass	11	47.82	14	60.86%	20	86.95%
Not pass	12	52.17	9	39.13%	3	13.04%
Total	23	100%	23	100%	23	100%
Average Score	59.13		68.73		75.04	

Discussion

PBL learning model is applied with the aim to improve fourth grade SD Negeri Mangunsari 02 Salatiga student learning outcomes. Implementation of class action is carried out in 2 cycles (4 meetings). Application of PBL learning model in cycle I goes well. However, there are still a few students who seem to be enjoyed in playing alone, not listening to the teacher's instructions, and still feeling shy when the group is required to read out the result of the discussion in front of the class. On the

other hand, it appears that some students have been seen to be active, creative, cooperate, and able to build their own knowledge by solving the science problems related to daily life. In cycle I, students look more enthusiastic because researchers use real objects to attract students 'attention so that students' understanding affects the learning outcomes. However, the increase in learning outcomes has not been maximized and has not reached the provisions that have been applied so that the action needs to be done cycle II.

In cycle II, learning still apply PBL model, but the researcher gives more real objects so that all students are more enthusiastic and confident in following the learning process. This also affects the students' understanding, because with the PBL model and the help of real objects, the students can absorb the learning materials well. In addition, it is evident that students are able to explain the relationship between natural resources and the environment, provide examples of natural resources in Indonesia, explain the relationship between natural resources with technology, identify natural resource yields, and provide samples of natural resources processed Using technology. The process of student self-change is evident, starting to become more critical, active, creative, meticulous, responsible, confident, curious, and cooperative in learning. Thus, the application of PBL learning model can improve student learning outcomes, which is seen from the improvement of student learning outcomes in science subjects in grade IV SD Negeri Mangunsari 02 Sidomukti Sub-district Salatiga City. This result is in line with some previous studies. Septiasih et al. (2016), Rahmasari (2016), Trisnaningsih (2014) concluded that learning by applying the PBL model can improve student learning outcomes significantly compared with using conventional learning

CONCLUSION

Application of PBL learning model in science lesson has improved student learning outcomes in fourth grade of SD Negeri Mangunsari 02 Salatiga. Thus, teachers are expected to apply this learning model using real-life examples. Through the application of PBL, students will become more critical, creative, and active in the learning process.

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